

IMPACT MONITORING OF MINING ENTERPRISES IN BULGARIA PORTION OF THE NATIONAL SYSTEM FOR ENVIRONMENTAL MONITORING

Tsvetan Mitrov

University of Mining and Geology "St. Ivan Rilski", **Sofia – 1700, Bulgaria**

ABSTRACT

Changes that recently took place in the mining sector and originating environmental issues are discussed in the paper. Changes in the strategy of development of the national system for environmental monitoring are observed. In this connection the approach for constituting local monitoring systems and points for the needs of the mining sector is systematized. General and specific requirements for the constitution of those systems are developed as a portion of the national system.

INTRODUCTION

Issues related to protection of environment and sustainable development of each country, biospheric region or sector might be decided only on the background of data, sufficient in scope and reliability. Furthermore, knowing both the natural background contents, which is a natural fact and the impact of anthropogenic activity is equally important. In this connection, the establishment of an effective system for monitoring, combined to the collection and distribution of data about environment is the only correct approach for the formation of a correct environmental policy, which does not admit exceeding the threshold of tolerance, i.e. the threshold abilities of nature to rehabilitate and restored itself.

Difficulty of the task is evident in scientific and economic aspect, as far as the environmental monitoring is defined as a system of repeating observations according to a certain schedule aiming a certain purpose on one or several components of the environment.

Uniqueness of ecological systems, integration of sites of nature and industry and trans-boundary effect do not admit a standardization of decisions. Specific research developments are required for each specific case. Especially, the specifics of background content, partial presence or complete absence of certain components and characteristics of antropogenesis for specific sectors, technologies etc. need to be studied.

NEW CONDITIONS AND REQUIREMENTS FOR THE NATIONAL SYSTEM OF ENVIRONMENTAL MONITORING

For the last years Bulgaria has been experiencing a period of significant economical and social difficulties, revealed in reduction of production and unemployment. Power cost is in a period of reformation, which does not encourage production and use of low quality coal. New enterprises are being opened, mainly in nutrition industry with low power consumption, which involves environmental difficulties. Closure of enterprises of

proven environmental inadvisability meets an opposition because of the high rate of unemployment.

After the year 1990 there is a significant reduction in ferrous and non-ferrous metallurgy, machine building, electrical engineering, transport and transport vehicles, chemical industry and ore mining, end consumption and ore mining. End consumption of electric power in the sectors of industry is at a level of 65,5% compared to 1990, and nearly 50 % of this is in the industry. That view brought to significant reduction of contamination, except for energy, where the portion of thermal power plants is 58,2%. In the meantime, we witness a very sensitive attitude of society for environmental issues.

In that connection the following environmental programs are being developed and introduced into practice a program for monitoring (environmental audits 1995 – 1997 of operating large enterprises, contaminating the environment; governmental program for stage-by stage reduction of ozone destroying agents (with the financial support of CEF); National Program for limiting the emissions of sulfuric oxides, National Program for chemical safety; National Program for waste management; Program for management the Black sea on-shore zone; Program for step-by-step re-categorizing the major river valleys and projects for management of waters along the valleys of rivers in South Bulgaria; Integral National Program "Environment and Health", Program for preservation of the biological variety of Bulgaria, Program for implementation of projects related to the inter-regional program for environmental protection in the valley of the Danube river etc.

The work on the National Analytical System for environmental monitoring (ACEM), basis for environmental management, has been carrying on for more than 10 years. The system involves a combination of background and impact monitoring, i.e. monitoring of reactions of main components of biosphere and factors of sources of contamination. The idea for its constitution is based in the general principles of reliability, unity, compatibility, efficiency and development. The ACEM maintains relations with all the European information systems and programs as CORINE-AIR, CORINE-LAND

COVER and the International Program for protection of nature in the valley of the Danube River.

Hierarchically the system is constructed in three levels: I-level – Central dispatching point; II level- Regional points and III level – Network for observation, assessment and control.

Depending on the rate of human participation the system is automated or non-automated in the specific subsystems and it aims the following goals:

- To implement regular observations on the condition and changes of environment;
- To accumulate and process data;
- To provide information for operative monitoring;
- To predict the impact and provide alternative decisions for optimization;
- To reason the environmental advisability of development of different activities;
- To automate processes of registration, transmission and processing of information.

Tasks and principles for construction of the system involve requirements towards the technical means. Before the year of 1992 within the system of the Ministry of environment there were only laboratories of the classical type – for routine analyses, which were carried out manually. Since the beginning of the 1992, according to an agreement with the European Union, an implementation of PHARE program started for delivery of new equipment for laboratory analyses, of automated mobile and stationary stations.

Apparatuses, which are suitable for initial monitoring of “shot” contamination: pH-meters, oxygen-meters, conductivity-meters; DV-VI spectrometers, samplers etc. for heavy metals were delivered as well as AAS, ICP, chromatographs, gaseous, liquid, ions, gas-chromatographs, mass detectors, segment analyzers for water – automated, with a capacity of 140 samples per hour, automated and robotized analyzer for BPK/HPK for 50 samples for hour. The laboratories are equipped with the most modern micro-processors. Modern biological laboratories for biological and micro-biological monitoring are created for the first time.

Emission mobile laboratories provide an opportunity for complete monitoring of emissions of air through the truck mounted laboratories.

It may be mentioned that ACEM has availability of the most modern equipment for observation, monitoring and control of the quality of environment, which is comparable to the most recent world manufactures. That allows the participation of the country into large regional international programs and investigations. The system supports the formation of correct policy of the country in the aspect of nature protection.

ALTERNATIVE OF ENVIRONMENTAL MONITORING IN THE MINING SECTOR

Within the above setting of the construction of ACEM, the only reasonable alternative for environmental monitoring of mining enterprises in the country is their construction as a part of the whole, observing the general national principles. Thus a bilateral exchange of information will be carried out and especially objective assessment of real condition will be performed for trans-boundary contamination etc. An opportunity for using the data basis of long-term meteorological observations is established, use of data about forest and biospherical components. Those data are especially useful for predicting the anthropogenesis and reasoning the environmental advisability of development of natural systems.

The analysis, prepared from a point of view of metrological provision of data about local monitoring points at mining enterprises, brings to the following recommendations:

- Selection of the most appropriate mode for monitoring should be complied to sources and type of contaminants, with their quantitative characteristic, availability of biospheric components, loading of the background with contaminants; manageability of factors and other specific peculiarities. Number and density of points for observation, mode of operation – discontinuous, continuous, with periodical sampling.
- Important aspect of the stage of preparation is the establishment what regular observation are implemented in the ACEM or another national and regional systems. What are the data bases established in them and what are the technological requirements for compatibility. In the meantime, the information, technological and qualitative characteristics, means and systems for monitoring, technical requirements for compatibility need to be analyzed.

An opportunity for development of the system need to be scheduled based on data about prospective development of the site, neighbor sites and trans-boundary contamination.

Aiming optimum economic and technical advisability, mathematical interpreting and statistical processing the following need to be established:

- Needed precision of specific measurements;
- Frequency of measurements and sampling;
- Opportunity for averaging the results of specific measurements;
- What are the technological decisions that satisfy the needed rate of reliability in data transmission , cable connection etc.
- The needed rate of mechanization and automation of observations, processing and data transmission
- possibility for realizing the observations by a standard equipment, compatible to local, regional and national systems.

As it has already been mentioned, the specifics of impact for each specific case may not be subjected to unified schemes and technical decisions. For each specific site they are implemented after specific investigation and represent an individual decision. The most complicated at this stage and in the nearest future are the issues related to closure of mining enterprises. The difficulties due not only to non-standard organization but also to non-predictable character of

development of anthropogenesis after interruption of activity. In that aspect the role of the University of Mining and Geology "St. Ivan Rilski" and the department "Engineering geoecology" is extremely important.

As a conclusion, it is worth mentioning that one of the most important pre-conditions for development of environmental monitoring is the improvement of general environmental knowledge of staff and training of higher educational professionals in engineering geoecology. That education has

been commissioned into practice for more than 10 years by the University of Mining and Geology "St. Ivan Rilski".

REFERENCES

Condition of the environment in the Republic of Bulgaria,
Annual Bulletin of the Ministry of Environment and the
Executive Agency of Environment, Sofia

*Recommended for publication by Department
of Engineering Geoecology, Faculty of Geology and Prospecting*